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EXAMINER	
SHERMAN, STEPHEN G	

ART UNIT	PAPER NUMBER
2629	

DATE MAILED: 09/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/606,752	HAM ET AL.	
	Examiner	Art Unit	
	Stephen G. Sherman	2629	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 August 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *7-10 and 18-23* is/are allowed.

6)☒ Claim(s) *1-6 and 11-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 November 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the amendment filed the 16 August 2006. Claims 1-23 are pending.

Response to Arguments

2. Applicant's arguments, see page 8, paragraph 4 to page 9, paragraph 2, filed the 16 August 2006, with respect to claim 1 have been fully considered and are persuasive. The rejection of claim 1 under 35 USC § 112 first paragraph has been withdrawn.

3. Applicant's arguments filed the 16 August 2006 with respect to claims 1-6 and 11-17 have been fully considered but they are not persuasive.

On page 9, paragraph 4 of the applicant's arguments the applicant states that in rejecting claim 1 the examiner cites no part of ARA, Morita or Lee as teaching "wherein reducing the number of bits includes converting an odd source data value into an even source data value." The examiner agrees that he did not cite a part of ARA, Morita or Lee as teaching the feature, but instead stated that since Morita does teach in paragraphs [0026]-[0029] of reducing the number of bits of the source data, reciting that in his preferable modes he converts 8 bits to 5 bits, 6 bits to 4 bits, and 6 bits to 3 bits, that it would have been obvious to "one of ordinary skill" in the art at the time the invention was made that the method converts not only even source data to odd/even

source data but also odd source data to even source data since the purpose of the invention is to reduce the number of bits in order to reduce frame memory.

On page 10 the applicant argues that Lee does not cure the deficiencies of ARA and Morita, and does not teach "wherein the modulator replaces all of the bits of the source data with preset modulated data" as recited in claim 11 by reciting paragraphs [0100]-[0102] of Lee. The examiner stated in the rejection, however, that his interpretation was that the bit numbers of the previous and present frames are both equal to 6-bits. The examiner further interprets that the modified 8-bit signal which is outputted is the preset modulated data, which is more than the bit number of the reduced-bit previous and current frames. The 8-bit value is preset because prior to the comparing of the previous and current frames 6-bit numbers, the 2-bits which are supplied to the data gray scale signal converter 480 are already known or *preset*. Then, the 6-bit values of the present and previous frames are compared and modified to a 6-bit value that was also preset in the data gray signal converter 480. Since the preset 6-bit modified value is then added to the known 2-bit value to create an 8-bit signal, the preset data bit number is greater than the bit number of the reduced frames. Also since the modulator outputs the newly modified *preset* 8-bit signal, all of the bits of the source data are replaced with the newly created 8-bit value before being output. Therefore ARA, Morita and Lee do teach the claimed limitations of claim 11.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1-6 and 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the applicants' APA (Specification paragraphs [0003]-[0018] and Figures 1-4), in view of Morita (US 2002/0196221) and further in view of Lee (US 2001/0038372).

Regarding claim 1, APA discloses a method for driving a liquid crystal display, comprising the steps of:

receiving source data (Figure 4, Data in);

comparing source data of a previous frame with the source data of a current frame to select a preset modulated data in accordance with the result of the comparison (Figure 4, Fn and F_{n-1} and page 5, paragraph [0010], 2nd sentence); and

modulating the source data by using the selected modulated data (Figure 4, Mdata Out).

The APA fails to teach of reducing the number of bits of the source data, thereby generating a reduced-bit source data.

Morita teaches of reducing the number of bits of the source data, thereby generating a reduced-bit source data (Page 2, paragraph [0022]).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA and Morita in order to create a liquid crystal display driving method that would not cause deterioration in picture quality but would also reduce the memory of the lookup table.

APA and Morita fail to explicitly teach of the method wherein reducing the number of bits includes converting an odd source data value into an even source data value.

However, Morita does teach in paragraphs [0026]-[0029] of reducing the number of bits of the source data, reciting that in his preferable modes he converts 8 bits to 5 bits, 6 bits to 4 bits, and 6 bits to 3 bits.

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made that the method taught by the combination of APA and Morita converts not only even source data to odd/even source data but also odd source

data to even source data in order to provide a liquid crystal device which is capable of reducing the memory capacity of a frame memory to be used for delaying input data.

APA and Morita fail to teach of a method for driving a liquid crystal display wherein a bit number of a reduced-bit source data of a previous frame is the same as that of a current frame, and a bit number of the preset modulated data is more than that of the reduced-bit source data of each previous frame and current frame.

Lee discloses a method for driving a liquid crystal display wherein a bit number of a reduced-bit source data of a previous frame is the same as that of a current frame, and a bit number of the preset modulated data is more than that of the reduced-bit source data of each previous frame and current frame (Figure 11 and paragraphs [0096]-[0102]. The bit numbers of the previous and present frames are both equal to 6-bits. The examiner interprets that the modified 8-bit signal which is outputted is the preset modulated data, which is more than the bit number of the reduced-bit previous and current frames. The 8-bit value is preset because prior to the comparing of the previous and current frames 6-bit numbers, the 2-bits which are supplied to the data gray scale signal converter 480 are already known or *preset*. Then, the 6-bit values of the present and previous frames are compared and modified to a 6-bit value that was also preset in the data gray signal converter 480. Since the preset 6-bit modified value is then added to the known 2-bit value to create an 8-bit signal, the preset data bit number is greater than the bit number of the reduced frames.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to use the method taught by Lee with the method taught

by the combination of APA and Morita in order to enhance the response speed of the liquid crystal by modifying the liquid crystal driving method without modifying the structure of the TFT-LCD.

Regarding claim 2, APA, Morita and Lee disclose the method of claim 1.

Morita also discloses wherein the selected modulated data is set to be a minimum value within a data band that includes a plurality of initial modulated data, wherein each of the initial modulated data is larger than a current data value of the current frame, when the current data value of the current frame is larger than a previous data value of a previous frame (Page 2, paragraph [0031]. The examiner interprets the lookup table of consisting of initial modulated data and that a value larger than the current data value (first input data) could be chosen from this table when the current data is larger than the previous data (second input data) and that in selecting this data, since overshooting is being performed, that it would be logical for the value in the data band that would be selected would be the minimum value because all of the values are larger than that of the current value and the next highest number would be the minimum.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow for the optimization of display characteristics.

Regarding claim 3, APA, Morita and Lee disclose the method of claim 1.

Morita also discloses wherein the selected modulated data is set to be a maximum value within a data band that includes a plurality of initial modulated data, wherein each of the initial modulated data is smaller than a current data value of the current frame, when the current data value of the current frame is smaller than a previous data value of a previous frame (Page 2, paragraph [0031]. The examiner interprets the lookup table of consisting of initial modulated data and that a value smaller than the current data value (first input data) could be chosen from this table when the current data is smaller than the previous data (second input data) and that in selecting this data, since overshooting is being performed, that it would be logical for the value in the data band that would be selected would be the maximum value because all of the values are smaller than that of the current value and the next lowest number would be the maximum.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow for the optimization of display characteristics.

Regarding claim 4, APA, Morita and Lee disclose the method of claim 1.

Morita also discloses wherein the source data is modulated to a current data value of the current frame, in modulating the source data, when the current data value of a current frame is the same as a previous data value of the previous frame (Page 1, paragraph [0012] where it states: "That is, the lookup table 103 is set a value, in advance, so that, when a gray-scale value of an input 1 is equal to a gray-scale of an

input 2, the gray-scale value is output as an output 2..." The examiner interprets input 1 and 2 to be the current and previous frame data and that when these values are equal the lookup table is bypassed.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow the display to maintain the current settings when no change has been detected within the system.

Regarding claim 5, APA, Morita and Lee disclose the method of claim 1.

Morita also discloses the method of claim 1 further comprising delaying the reduced-bit source data by one frame interval (Page 2, paragraph [0023]).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow for the comparison between the current and previous frame value.

Regarding claim 6, APA, Morita and Lee disclose the method of claim 5.

APA, Morita and Lee fail to disclose wherein the source data is an 8-bît data, and the reduced-bit source data is a 7-bit data.

However, it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to make the source data 8 bits and the reduced source data 7 bits in order to save memory space by allowing for a smaller lookup table.

Regarding claim 11, APA discloses an apparatus for driving a liquid crystal display, comprising:

an input line for receiving source data (Figure 4, Data in); and

a modulator for comparing the source data of a current frame with the source data of a previous frame to modulate the source data by using a preset modulated data in accordance with a result of the comparison (Figure 4, Fn and F_{n-1} and page 5, paragraph [0010], 2nd sentence).

APA fails to teach of a bit converter for reducing the number of bits of the received source data to generate reduced bit source data.

Morita discloses a bit converter for reducing the number of bits of the received source data to generate reduced bit source data (Page 2, paragraph [0023]).

Therefore it would have been obvious to "one of ordinary skill" in the art to combine the teachings of APA and Morita in order to create a liquid crystal display driving apparatus that would not cause deterioration in picture quality but would also reduce the memory of the lookup table.

APA and Morita fail to teach of a method for driving a liquid crystal display wherein a bit number of a reduced-bit source data of a previous frame is the same as that of a current frame, and a bit number of the preset modulated data is more than that of the reduced-bit source data of each previous frame and current frame, and wherein the modulator replaces all of the bits of the source data with preset modulated data.

Lee discloses a method for driving a liquid crystal display wherein a bit number of a reduced-bit source data of a previous frame is the same as that of a current frame,

and a bit number of the preset modulated data is more than that of the reduced-bit source data of each previous frame and current frame, and wherein the modulator replaces all of the bits of the source data with preset modulated data (Figure 11 and paragraphs [0096]-[0102]. The bit numbers of the previous and present frames are both equal to 6-bits. The examiner interprets that the modified 8-bit signal which is outputted is the preset modulated data, which is more than the bit number of the reduced-bit previous and current frames. The 8-bit value is preset because prior to the comparing of the previous and current frames 6-bit numbers, the 2-bits which are supplied to the data gray scale signal converter 480 are already known or *preset*. Then, the 6-bit values of the present and previous frames are compared and modified to a 6-bit value that was also preset in the data gray signal converter 480. Since the preset 6-bit modified value is then added to the known 2-bit value to create an 8-bit signal, the preset data bit number is greater than the bit number of the reduced frames. Also since the modulator outputs the newly modified *preset* 8-bit signal, all of the bits of the source data are replaced with the newly created 8-bit value before being output.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to use the method taught by Lee with the method taught by the combination of APA and Morita in order to enhance the response speed of the liquid crystal by modifying the liquid crystal driving method without modifying the structure of the TFT-LCD.

Regarding claim 12, APA, Morita and Lee disclose the apparatus of claim 11. Morita also discloses wherein the selected modulated data is set to be a minimum value within a data band that includes a plurality of initial modulated data, and each of the initial modulated data is larger than a current data value of the current frame, when the current data value of the current frame is larger than a previous data value of the previous frame (Page 2, paragraph [0031]. The examiner interprets the lookup table of consisting of initial modulated data and that a value larger than the current data value (first input data) could be chosen from this table when the current data is larger than the previous data (second input data) and that in selecting this data, since overshooting is being performed, that it would be logical for the value in the data band that would be selected would be the minimum value because all of the values are larger than that of the current value and the next highest number would be the minimum.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow for the optimization of display characteristics.

Regarding claim 13, APA, Morita and Lee disclose the apparatus of claim 11. Morita also discloses wherein the selected modulated data is set to be a maximum value within a data band that includes a plurality of initial modulated data, and each of the initial modulated data is smaller than a current data value of the current frame, when the current data value of the current frame is smaller than a previous data value of the previous frame (Page 2, paragraph [0031]. The examiner interprets the lookup table of

consisting of initial modulated data and that a value smaller than the current data value (first input data) could be chosen from this table when the current data is smaller than the previous data (second input data) and that in selecting this data, since overshooting is being performed, that it would be logical for the value in the data band that would be selected would be the maximum value because all of the values are smaller than that of the current value and the next lowest number would be the maximum.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow for the optimization of display characteristics.

Regarding claim 14, APA, Morita and Lee disclose the apparatus of claim 11. Morita also discloses wherein the source data is modulated to the current data value of the current frame, when the current data value of the current frame is the same as a previous data value of the previous frame (Page 1, paragraph [0012] where it states: "That is, the lookup table 103 is set a value, in advance, so that, when a gray-scale value of an input 1 is equal to a gray-scale of an input 2, the gray-scale value is output as an output 2..." The examiner interprets input 1 and 2 to be the current and previous frame data and that when these values are equal the lookup table is bypassed.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow the display to maintain the current settings when no change has been detected within the system.

Regarding claim 15, APA, Morita and Lee disclose the apparatus of claim 11. Morita also disclose wherein the modulator includes: a frame memory for delaying the reduced-bit source data for one frame interval (Figure 1, item 3 and page 2, paragraph [0023]); and a lookup table for comparing the reduced-bit source data of the previous frame with the reduced-bit source data of the current frame to select a preset modulated data in accordance with the result of the comparison (Figure 1, item 4 and page 2, paragraph [0024].

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow for a driving apparatus that could compare a previous and current frame and make an adjustment accordingly.

Regarding claim 16, APA, Morita and Lee disclose the apparatus for driving according to claim 15. Morita also discloses wherein the bit converter is connected between the frame memory and an input terminal of the lookup table (Figure 1, items 1, 3 and 4 where items 1 and 2 make up the bit converter in which item 2 is connected to item 3, the frame memory, and item 2 is also connected to an input terminal of item 4, the lookup table. Since the controller, item 2, is in combination with item 1 to make the bit converter, the bit converter is therefore between items 3 an 4, the frame memory and lookup table.).

Therefore it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to combine the teachings of APA, Morita and Lee in order to allow for the source data to be reduced before it is stored in memory so that it will take up less memory space.

Regarding claim 17, APA, Morita and Lee disclose the apparatus for driving according to claim 11. APA, Morita and Lee fail to disclose wherein the source data is an 8-bit data, and the reduced-bit source data is a 7-bit data. However, it would have been obvious to "one of ordinary skill" in the art at the time the invention was made to make the source data 8 bits and the reduced source data 7 bits in order to save memory space by allowing for a smaller lookup table.

Allowable Subject Matter

7. Claims 7-10 and 18-23 are allowable.

8. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 7, the primary reason for indicating claim 7 allowable is the inclusion into the existing claim language of the limitation of n-k bits corresponding to the most significant of the n bits and the inclusion of the limitation of replacing all of the bits within the n bit source data with the n bit modulated data in combination with the

claim previously reciting of setting a first and second n bit modulated data, which is not found singularly or in combination within the prior art.

Regarding claim 18, the primary reason for indicating claim 18 allowable is the inclusion in the existing claim language of the limitation of replacing all of the bits within the n bit source data with the n bit modulated data in combination with the claim previously reciting of registering a first and second n bit modulated data, which is not found singularly or in combination within the prior art.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen G. Sherman whose telephone number is (571) 272-2941. The examiner can normally be reached on M-F, 8:00 a.m. - 4:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amr Awad can be reached on (571) 272-7764. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SS

6 September 2006

AMR A. AWAD
SUPERVISORY PATENT EXAMINER